Bureau of Land Management
U.S. Department of the Interior

Developing the Financial Analysis for a BLM Information Technology Proposal

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How to Prepare a Financial Analysis for a BLM Information Technology Proposal

1 First Glance

The Bureau of Land Management (BLM) is improving its methods for selecting information technology (IT) projects. New projects are favored if they contribute to moving the BLM in directions laid out by the Bureau Architecture (BA). New projects also must show that they return benefits to the BLM and the nation that exceed their cost—or, if a project is mandated, that the BLM is pursuing the least-cost approach to getting the job done. Law and guidance from the Office of Management and the Budget (OMB) reinforce BLM's reliance on these selection criteria.

The Systems Coordination Office (SCO, WO-570) has issued guidance for the managers of proposed new IT projects, to assist them in providing the required evaluations. SCO guidance for preparing a Business Case requires that each project develop a benefit-cost analysis (or cost effectiveness analysis if appropriate) that conforms to OMB guidance provided in Circular A-94 and other OMB documents. This is a tall order for most BLM project managers, who have never performed a benefit-cost analysis, and have never been trained in the underlying business concepts.

To help project managers, SCO has developed Microsoft® Excel templates for benefit-cost and cost effectiveness analysis, a detailed example, and this document. The purpose of this document is to explain to you how to complete the required analysis using the SCO template, or another format you may choose. It presents just the information you need to know in order to perform the analysis, and to avoid various pitfalls.

This document does not address numerous alternative ways to assess the worth of projects. Return on investment, internal rate of return, "Total Economic Impact", and other calculations have their place, but are not required of you.

The rest of Section 1 provides a quick overview of the process you will follow to complete an analysis. Each topic is explained in more detail in the rest of the document. At the same time, we have tried to keep it informal—this subject is tough enough without adding academic garnish.

1.1 What Are You Trying to Accomplish?

Whenever you ask BLM management to approve a new IT expenditure or to accept your recommendation on a choice of alternatives, you need to show that this proposal is

a good investment for the American taxpayers. The prescribed way to do this is to prepare a benefit-cost analysis, following the rules laid down by OMB, that shows whether the benefits of this investment will exceed its costs. If your action is mandated to the BLM, and BLM has no choice but to do the action by the most efficient alternate method, you can prepare the somewhat simpler cost effectiveness analysis. Either way, you are trying to show, in dollars and cents wherever possible, that this proposal is a better use of BLM funding than other projects that are competing for the same dollars. Using SCO guidance and templates places all the competing proposals on a level playing field.

Figure 1.1 How Benefit/Cost Ratios Level the Playing Field

	Benefits	Costs	B/C Ratio
Project A	$30.6	$10.0	3.1
Project B	$38.6	$27.4	1.4
Project C	$34.6	$90.0	0.4
Project D	$55.0	$20.4	2.7

Benefit/cost ratios put competing projects on a "level playing field". Project A, with $30.6 of benefits, scores a better benefit/cost ratio than Project D, with $55.0 of benefits, because its costs are proportionately lower. Project C actually returns less in benefits than it costs—hence a benefit/cost ratio under 1.0.

1.2 What Decisions Should You Make Up Front?

Before you can fill in the template, you need to make some decisions that will have a very big effect on all the rest of your analysis. Each is a matter for your professional judgment. Record your decisions, and be prepared to defend them. Up-front decisions are:

What is the scope of your project? What products, results, and activities are you considering to be parts of your project? Whatever is inside the boundaries will be accounted for, either as costs or benefits. In turn, if you exclude a result or product from your analysis of costs, you won't be able to claim its benefits later on. For example, if you can foresee a follow-on project that will deliver value to the BLM, but don't include the costs of that project in your boundaries, you can't claim its benefits in your analysis. This is annoying, but it is proper accounting.

Another boundary you should set up front is the period of your analysis. The period needs to be long enough to include all the major costs and benefits you will analyze. It is most convenient to pick one of the time periods for which OMB provides financial factors: 3, 5, 7, 10 or 30 years. This period could, but does not have to, encompass the entire life-cycle of the IT investment—just make sure that the major benefits and costs that control the ratio of benefits to costs are counted in. This usually means you should include the time for development and full deployment, plus several years of O&M.

Is the project internal to the Government? You need to decide up front if your project is strictly internal to the Government; or whether it meets direct public needs for information, payments, or decisions, or competes with private sector investment. This will come up again when you are choosing certain financial factors that have to be included in the analysis. A project that is strictly internal to the Government generally improves or modifies the method by which the BLM does an internal business task. If, on the other hand, the project puts a kiosk for the public in the public room, or provides information over the Internet, or in some other way provides a direct service to the public, your project should be labeled as external. If your project is competing in some way with private investment it should be labeled as external. If only a portion of the project is aimed at the external services, you may want to separate the costs and benefits of the internal and external portions, but normally it will be simplest to count the whole project as external.

Do you need a benefit-cost analysis or a cost effectiveness analysis? This is a critical determination, and you should make sure your decision on it is shared by your project sponsor and SCO before you go any further. A benefit-cost analysis is appropriate when you are trying to show that a project should be undertaken. It is implicit that the BLM is not absolutely required to do the project, but that it is one of the best investments the BLM could make, in regard to improving its service or reducing its costs. If two projects are competing for the same funds, it is normal for the project with the largest ratio of benefits to costs to win the prize. In summary, then, do a benefit-cost analysis if the project is optional for the BLM.

Sometimes a result or product is required of the BLM by law or other outside authority. Or, a purchase is necessary to maintain current IT infrastructure, as in the case of a mandatory upgrade of an existing software product. A cost effectiveness analysis is

sufficient in such cases. If the desired result is fixed, and mandatory, the only decision for BLM managers is how best to go about achieving the result. For example, a field manager could face the requirement to provide ramp access to the front door of a newly-leased building. There is no choice whether to build the ramp—only alternative ways to get it done. BLM could invest in a concrete ramp, that will cost more but have little upkeep; or a plank-built ramp, that will cost less but require annual repainting. In cases like this, a cost effectiveness analysis provides the structure to compare the long-run costs to BLM of the alternatives. No accounting for benefits is required, because they are essentially the same for both alternatives.

The rules for cost effectiveness analysis apply to a lease-purchase analysis as well.

Because it is usually harder to quantify benefits than costs, it is tempting to force-fit a project into the "mandated" category, and do a cost effectiveness analysis. Be aware that "mandated" implies that BLM has no choice but to do this project—not just that your boss wants it done. In most cases, a benefit-cost analysis is appropriate.

1.3 What Do You Need Before You Can Start?

The SCO guidance for preparing a Business Case will march you through defining your project boundaries, your requirements, and your project schedule, budget and resources, before you get to this analysis. Prepare these components in advance, and get agreement where appropriate.

Project Team Form your project team as early as feasible, and include representation from the business, IT, and contracting components of BLM. Everything you develop in support of this financial analysis should be reviewed with this team.

Work Breakdown Structure (WBS) Listing all your tasks and subtasks is the first step in developing a schedule and budget. For costing purposes, you will want to separate the activities of contractors from BLM team members, and team members from incidental participants such as reviewers.

Project Schedule Each task and subtask must be placed along the project timeline. Normally, you will do this in a project management software tool, so that the tasks and their relationships can be visualized and readily maintained.

Project Resources You should assign personnel (by category) and other costs to each task and subtask in your WBS, within your project management software tool. By using the reporting capabilities of the project management tool, you can obtain totals in each cost category by year. This is the main source of your direct project costs for the financial analysis. **The project budget and the direct costs portion of the financial analysis must remain consistent with one another.**

You do not need to include the time that your managers spend in general supervision of you and your project. Those costs are provided for as indirect costs, below.

The labor rates should reflect your best estimate of who will work on the project. Often, you can only approximate the pay grade of a team member who would have the necessary qualifications to do the work. For contractors, use fully-loaded rates, meaning the actual total cost per hour to purchase the contract services, including fee. For Federal workers, select appropriate pay rates (and locality pay) from the current pay schedules (see Section 3.1.1 for details). Whether or not you escalate pay rates for future years depends on whether you choose to work in constant or current dollars (covered in Section 6).

Shared Costs You also have to account for the cost of resources your project intends to share with other activities, even though your project most likely will not directly pay for those resources. This is part of accounting for all costs of the project, not just the obvious ones you pay for. Common examples are (1) adding substantial load to an existing class of servers; (2) adding a substantial new load on the LAN or WAN: (3) using existing plotters and plotter supplies in a routine, relatively heavy manner; (4) diverting a substantial portion of support staff labor to support maintenance and user support; and (5) sharing license maintenance costs with another major project.

Note that sharing arrangements should be discussed and agreed upon before you commit to them in this analysis. If there is reasonable doubt that sharing will really work out, you should assume the worst and plan to absorb 100% of the cost of meeting your needs. In any case, your dependence on a sharing arrangement introduces a risk into your project, which you ought to consider later on when you are preparing your risk assessment.

Indirect Costs To make sure that the full cost of using Federal employees is included, OMB Circular A-76 provides average overhead factors, which you will calculate and include in the fully-loaded cost of Federal labor. Accountants label overhead as an indirect cost. *For simplicity, the spreadsheet templates provided with this document assume that you will combine direct pay and overhead into fully-loaded labor rates for Federal workers, rather than separating them out in different rows.* If you prefer, you can modify the spreadsheets to show overhead explicitly.

Other indirect costs include staff time you will use, but expect to be paid for by someone else. For instance, the labor of 30 reviewers around the BLM who spend ½ day each in reviewing your requirements document usually would be absorbed by their program budgets, as a normal part of their work in support of their programs. It is nonetheless an indirect cost of your project, and must be accounted for in full (including the 0.48% overhead factor).

Benefits Data You will probably have to do a large amount of research around the BLM to get the information and opinions you need in order to characterize project benefits. Benefit estimates are always judgmental, and based on assumptions that your reviewers may or may not accept. For this reason, you need to record in the assumptions portion of the template the full basis for each benefit you have listed. If you claim a benefit and provide no logic, source, or basis, you are likely to be called on it by the SCO and the IT Investment Board. Make sure that the business sponsor of this proposal agrees with you estimate of benefits.

How about intangible benefits? This is discussed further in Section 5, but you should be aware that OMB strongly encourages Federal project managers to convert benefits that may, at first, seem intangible, into tangible benefits that are quantified either in dollars or in quantity. Any truly intangible benefits remaining after you make that effort should be recorded in the benefits section of the template in a notes section.

The template provides for two broad types of tangible benefits: new benefits, and benefits from improving the way an existing job is done. The latter category usually predominates. New benefits truly add capability, services, or products that were previously unavailable. Improvements are calculated by subtracting the labor and other costs of the old way of doing business from the parallel costs of the new way of doing business. For example, you may propose to replace manual preparation of an annual report with automated production. The old way is heavy on labor costs; the new way may be heavier on IT costs, but save greatly on labor. All the costs of both the old and new ways of producing the desired report must be included in this comparison, to maintain a level playing field. Remember to include the 0.48 overhead factor when calculating Federal labor costs.

Costs and Benefits to the BLM BLM management requires that you be able to account separately for the real costs and real benefits that BLM will experience as an agency. This is actually not part of your benefit-cost analysis, and is not required by OMB, but since BLM management wants to know, it is most efficient to prepare a table that extracts only those direct costs and benefits while you preparing materials for the financial analysis.

Key References Numerous regulations, reports, courses, and books are available to help you prepare an excellent financial analysis. However, you should obtain and review the following references before you start.

1. OMB Circular A-76 "Performance of Commercial Activities" and Supplement, and especially Part 2 "Preparing the Cost Estimate". Download at: **http://www.whitehouse.gov/OMB/circulars/index.html**. Circular A-76 is used for making outsourcing decisions, and sets out all the rules for ensuring that the full and comparable cost of performing an activity by the Government or by the private

sector is properly and consistently calculated. OMB Circular A-94 requires its use.

2. OMB Circular A-94 "Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs". Download at: **http://www.whitehouse.gov/OMB/circulars/index.html**. Circular A-94 is the basic guidance for your financial analysis. It is short, and except for some scary economic theory on incidence and distributional effects (chapter 11), will be very understandable to you after you have read through this report. Circular A-94 is updated twice each year, near the beginning and middle of each calendar year, with revised discount rates.
3. OMB Letter "Estimating Paperwork Burden", October 14, 1999. Download at: **http://www.whitehouse.gov/OMB/fedreg/5cfr1320.html**. This memorandum provides guidance for "monetizing" the paperwork burden on the public that your project may impose. OMB is proposing (and encouraging) agencies to convert estimates of the extra work hours they impose on the public into dollar estimates. The definitions and guidance provided in this short memorandum will help you to quantify the costs and benefits of your project on the public.
4. "ROI and the Value Puzzle", Capital Planning and IT Investment Committee, Federal CIO Council, April 1999. Download at: **http://www.cio.gov/docs/library.html**. This is an excellent guide to financial analysis of Federal decisions. It provides much more depth than this report on most topics, and covers a wide variety of approaches you could use to evaluate alternatives. Any BLM project manager will benefit greatly from reading it. Many of the examples included in Sections 4 and 5 of this report are borrowed from "ROI and the Value Puzzle".

These few references are all you need to prepare a proper and defensible BLM financial analysis.

Knowledge of MicrosoftÒ Excel If you intend to use the SCO templates, you must have a basic working knowledge of Excel. In Excel terminology, the templates consist of individual "sheets" that are combined into "workbooks". Equations define relationships among cells on a sheet and between sheets. Although the basic structure and equations are all provided to you in the templates, you will certainly have to add further lines, and very likely modify equations or factors, in order to represent your project. Using the templates blindly is sure to produce errors.

1.4 What Are the Main Pieces You Will Create?

After you have made your decisions and gathered your information, you can proceed with creating the individual pieces of the analysis. These are:

1. Alternatives: You need to define 1-3 alternative approaches, and develop much the

same cost and benefit information for these as for your proposed project. Realistically, you only need to account for the big differences between your alternatives—those costs and benefits that remain the same between alternatives and your proposal "drop out" of the analysis, because they do not affect comparisons. While less detail is required for the alternatives, fairness will be expected by reviewers. Create a separate workbook for each major alternative.

2. Cost Sheets: You will enter all your direct, shared, and indirect cost information into the cost sheets of the template workbook for each alternative. You may wish to insert additional, customized sheets to perform the basic cost calculations. As you enter costs into the cost sheets, record related assumptions, with sheet and cell references, on the "Assumptions" sheet.
3. Benefits Sheets: You will enter your benefits information into three sheets: "Benefits Calculation", "Future Costs", and "Current Costs". "New" benefits are entered directly on the "Benefits Calculation" sheet. If the benefit results from improving how a task is done, enter the costs for the old way of doing business on the sheet labeled for current costs, and the costs for the new way of doing business on the sheet labeled for future costs. Then, ensure that the total "current costs" and "future costs" of performing an activity are subtracted in the column for each year that appears on the "Benefits Calculation" sheet, where the cost differences between all current methods and future methods are combined to get the net benefit (net cost reduction).

   This process of adding up the "current costs" and "future costs" and then subtracting them to obtain "benefits" can be very confusing at first. However, this is the best way to show explicitly how you arrived at estimates of cost savings that should be attributed to your proposal.

   Fully document your assumptions and calculations on the "Assumptions" sheet of the workbook. These cost sheets will require the most care and knowledge of Excel, since the template cannot anticipate the form of your calculation for the "before" and "after" costs. For example, you may have to separate your calculations for State office and Field Office activities, or for different States, and you may have several labor categories to account for separately.

   In addition to the benefits from cost savings, the "Benefits Calculation" sheet is where you should enter any "new" benefits, such as the value of a completely new service to the public, or introduction of a new tool to help BLM staff do their jobs. Intangible benefits should be listed as textual notes below the calculations on this sheet. When complete, the "Benefits Calculation" sheet shows all benefits, and the year in which they will be realized.

1.5 How Do You Combine the Pieces to Get An Answer?

The "Summary Sheet" in each workbook automatically brings all the costs and all the benefits together in the proper years and categories, and subtracts costs from benefits. If it is a benefit-cost analysis, the Benefit/Cost Ratio is calculated automatically. If it is a cost effectiveness analysis, the "Summary Sheet" will show the Net Present Cost of the project. All discounting is performed on the "Summary Sheet", and the Payback Period is identified and typed in by you, on the basis of cumulative costs and benefits that are shown on the "Summary Sheet". In other words, if you get all the other sheets filled out correctly, this one is a breeze!

You will now have a "Summary Sheet" for each of your alternatives, and can easily compare their Benefit/Cost Ratios and Payback Periods (or Net Present Costs). You can also use your workbook to test the sensitivity of these results to uncertainties in your assumptions, by simply plugging in smaller or larger values for key costs and benefits, and letting Excel calculate the new result for you.

1.6 A Summary of Recommended Steps

The main steps can be summarized as follows:

1. Download and review the recommended references. Read all of Circular A-94.
2. Form a business team to help your with benefits and costs.
3. Create a separate workbook for each major alternative.
4. Write down definite project boundaries (including time-span of analysis) and define alternatives.
5. Is this a benefit-cost or cost effectiveness analysis?
6. Decide whether to use nominal (inflated) dollars) or constant dollars (Chapter 6).
7. Pull together your work breakdown structure, schedule, and project budget. You also need to estimate the indirect labor costs of your project.
8. Identify, quantify, and justify (as assumptions) all the major benefits of your project. Ask your business team to review and confirm them.
9. Load the major costs and benefits into the appropriate sheets of each workbook. Enter your assumptions concerning each number at the same time.
10. Check your logic, your math, and your Excel equations.
11. Decide on, and enter the discount rate on the "Summary Sheet" (Section 6).
12. Review and check results. There are many paths to a wrong answer in Excel.
13. Ask your business team to review the completed workbooks.
14. Perform sensitivity analysis (what-ifs) using copies of these workbooks, and include the results in your risk analysis.
15. Incorporate the results into Chapter 6 of your Business Case document.
16. Plan for updating the analysis throughout your project.

The remainder of this document provides more help on these steps. A detailed example of a benefit/cost analysis performed in accordance with this document, and using the benefit/cost template as a basis, is provided on the SCO intranet site, at **http://web.blm.gov/internal/wo-500/sco/sco_procedures.htm**. Comparing this example to the benefit/cost template, you can see where modifications of the template were made to accommodate the details of a real-world project. You may wish to refer to the templates and to this example frequently as you work through the rest of this document.

2 Introduction to the Templates

The SCO has developed separate Excel templates for benefit-cost analysis and cost effectiveness analysis, which you are welcome to use as a starting point. You are free to use a different software tool or do the work manually, also. The Excel templates will accommodate most common BLM IT projects or acquisition decisions, but cannot anticipate all the details of your project. You will have to modify each of the sheets in a template to list your costs, benefits, and assumptions, and may have to add columns for additional planning years, or to differentiate locations. Anytime you make changes, you introduce the possibility of calculation errors. The templates are a big help, but you are responsible for making sure your own analysis is correct and complete.

2.1 Where Can You Get the Templates?

Hard copy of the templates is provided in Appendix A. You can download these templates from the SCO page of the BLM Intranet. The specific page can be found at http://web.blm.gov/internal/wo-500/sco/sco_procedures.htm. The files are named as follows:

- ✓ ***Benefit-Cost Analysis Template.xls***
- ✓ ***Cost Effectiveness Analysis Template.xls***

You may also call the SCO at 303-236-8915 to make another arrangement, or to obtain help.

The headers and footers on each sheet should be changed to reflect your project and alternative title. This will be a big help in keeping all your analysis products straight. In addition, when you set up your sheets for printing, you should select the option to print row and column labels on each sheet. This will greatly simplify references to your assumptions.

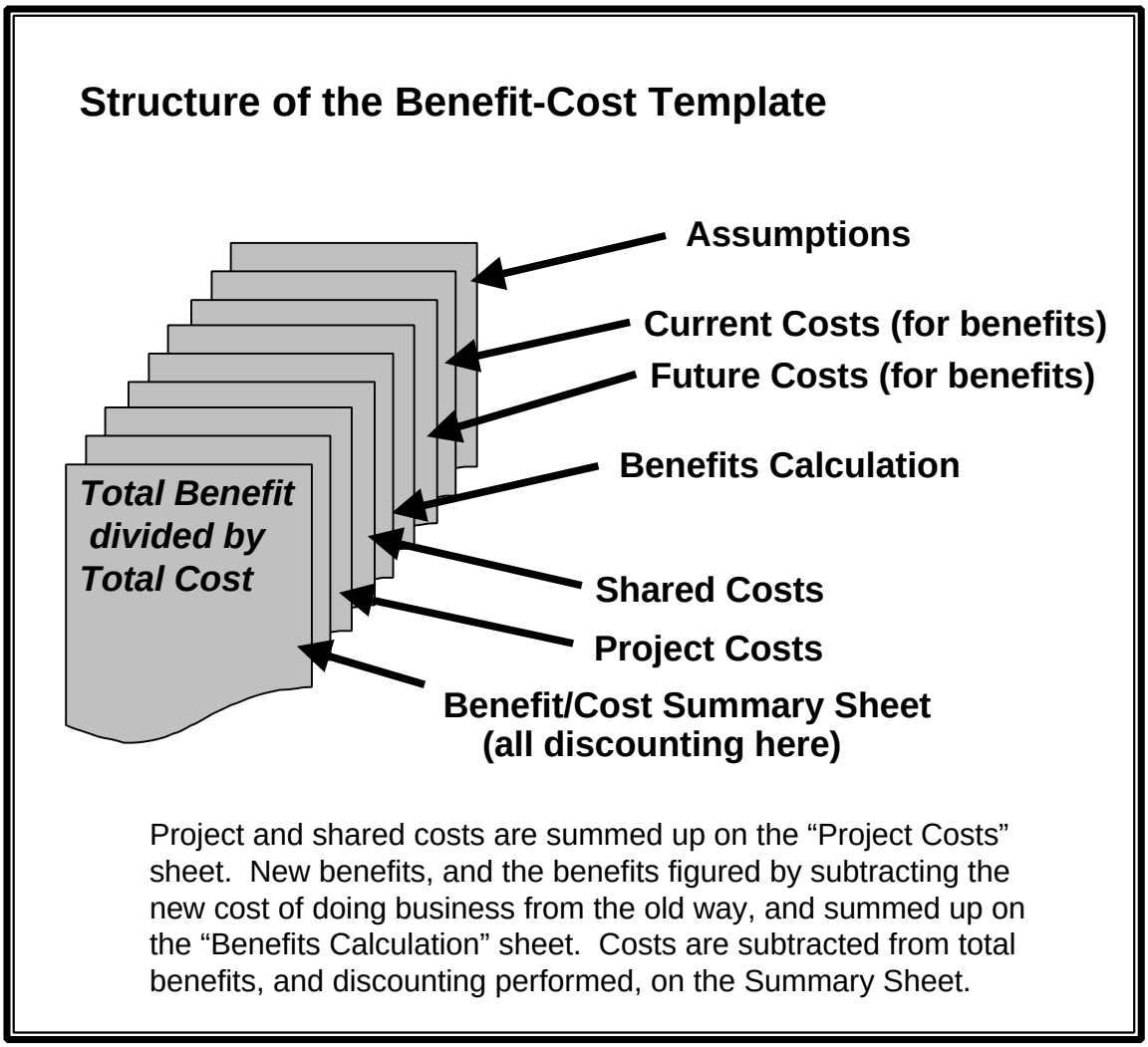
2.2 How Is the Benefit-Cost Workbook Organized?

Figure 2.1 shows the worksheets that combine to make up the benefit-cost template. The benefit-cost template contains the following worksheets, in this order:

1. *Summary_Sheet*: Summary of costs and benefits, with yearly totals; discount factor; discounted costs and benefits; benefit-cost ratio; payback year calculation. All discounting is performed on this sheet only.
2. *Project_Costs*: Direct and indirect project costs by year; summary of shared costs

by year.

Figure 2.1 How the Benefit-Cost Template is Organized



3. *Shared_Costs*: Calculations of this project's share of capital and O&M costs for items that are shared with other accounts.
4. *Benefits_Calculation*: Summary of all tangible benefits by year, consisting of (1) calculation of cost savings between old and new ways of doing business (referred from following sheets); (2) calculation of benefits from new capabilities, services, or products; and (3) salvage value. Salvage value is counted as an addition to future benefits. It could just as well be figured as a reduction of future costs. Summary of intangible benefits included as notes.
5. *Future_Costs*: Calculation of all costs to produce service or product using the new method that this project will introduce, by year. Normally a unit cost multiplied

times a number of instances per year.

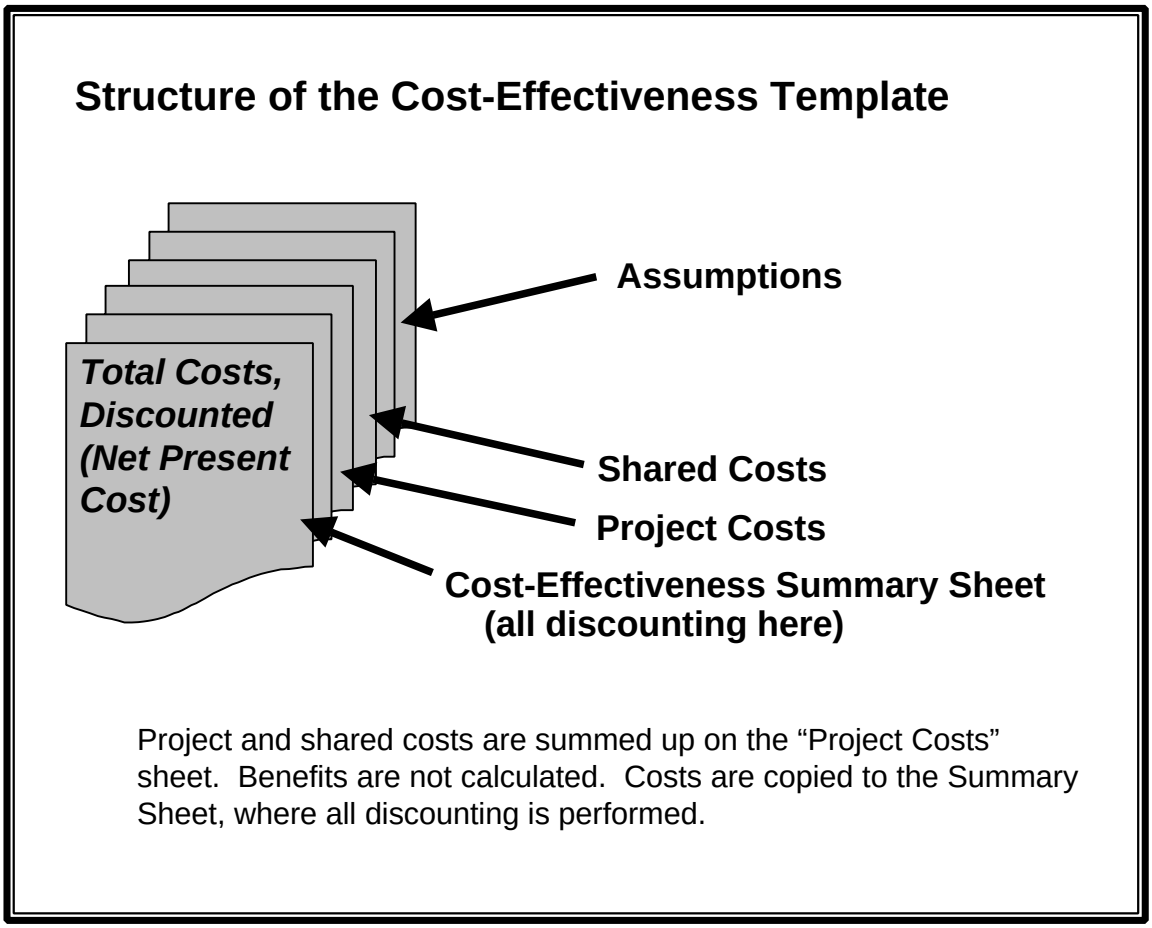
6. *Current_Costs*: Calculation of all costs to produce service or product using the methods now in place. Normally a unit cost multiplied times a number of instances per year.
7. *Assumptions*: Method, assumed values, and sources of information to support each calculation. This text is tied to the source spreadsheet by a sheet name and cell reference on this sheet.

2.3 How is the Cost Effectiveness Analysis Workbook Organized?

Figure 2.2 shows the worksheets that combine to make up the cost-effectiveness analysis template. The cost effectiveness analysis workbook dispenses with all the benefits calculation sheets.

1. *Summary_Sheet*: Summary of all costs, with yearly totals; discount factor; discounted costs; Net Present Cost. All discounting is performed on this sheet only.
2. *Project_Costs*: Direct and indirect project costs by year; summary of shared costs by year.
3. *Shared_Costs*: Calculations of this project's share of capital and O&M costs for items that are shared with other accounts.
4. *Assumptions*: Method, assumed values, and sources of information to support each calculation. This text is tied to the source spreadsheet by a sheet name and cell reference on this sheet.

Figure 2.2 How the Cost-Effectiveness Analysis Template is Organized



3 How Do You Figure Your Costs?

The section will help you understand what categories of costs OMB expects you to consider in a financial analysis. For this purpose, you will be including costs that would never appear in a BLM project budget, but affect the financial justification of your project.

3.1 What Costs Are Included?

In general, your analysis will include all costs that are incurred because of your project, whoever they fall on and whenever they occur, except for costs on non-U.S. citizens, governments, or organizations.

Exclude all "sunk costs" from your analysis. "Sunk costs" are dollars already spent or irrevocably committed. Today's decision is about where to spend new dollars. Consistency with past decisions is not an issue. Irretrievable past investments should not enter into your financial analysis, or your decision process.

3.1.1 Costs to the BLM

These costs include the direct project expenses, for which funds are specifically earmarked. Examples include:

- ✓ Equipment: servers, desktops, networking hardware, upgrades, power supplies and protection, lab and test equipment, new facilities.
- ✓ Software: COTS purchase or lease, annual license fees, desktop and workgroup software, operating and network operating systems, design and development tools, support agreements.
- ✓ Labor: direct salary cost of user team involvement, contractor labor (if level of effort), and team salaries for development and modification, installation and transition, training design and execution, system and infrastructure maintenance
- ✓ Other Direct Costs: contractor labor and other costs on a firm fixed price basis, upgrades to power or telecom, supplies, travel costs

You should consult Circular A-76 for questions on costing that come up in your project. For example, the useful life you should assume for capital assets is listed. A-76 says to figure government labor rates at step 5 for General Schedule and Step 4 for Federal Wage System employees, and divide the annual rate by 1,776 to obtain the direct hourly rate. If you know where the work will be performed, add in locality pay as well.

These are the actual project costs that BLM management wants listed separately in your business case.

This category also includes Indirect Costs, such as:

- ✓ labor-related overhead per OMB Circular A-76 for Federal employees
- ✓ general and administrative overhead, also per Circular A-76.
- ✓ cost of participation by reviewers and other non-team participants
- ✓ costs of reduced productivity during transition, cost of converting data or forms to new requirements
- ✓ cost of team training not specifically paid out of project budget

Labor-related overhead for Federal workers includes the cost of holidays, sick leave, and retirement; and the cost of general management, office space, and supplies. The current A-76 factors (November 2000) combine into a 0.48 overhead factor. That is, the overhead cost of a Federal labor hour is 0.48 times the nominal pay rate for each grade.

Employee training costs are direct, if funded from the project budget, and indirect, if funded from another account.

3.1.2 Costs to the Government

OMB expects you to account for costs to any part of the Government, not just costs to BLM directly. For example, a change in BLM report formats might impose modification costs on the Minerals Management Service. These costs are included in the analysis as an indirect project cost, because the ratio of benefits to costs, for the Government as a whole, is affected. Other agencies can experience direct costs also, if, for example, they participate directly in the project.

3.1.3 Costs to BLM's Public Customers

The Paperwork Reduction Act of 1995 and OMB's implementing regulations (5 CFR Part 1320) require that your analysis account for any costs your proposal would impose on BLM customers. (See the reference OMB document on the Paperwork Reduction Act.) If the proposed new way of doing business will cost BLM customers more time, you should estimate the time penalty per contact and the total time penalty to all BLM customers. You are encouraged to convert this to a dollar cost estimate. However, OMB has not resolved all the issues that come up when you try to attach a dollar value to the time of a Government customer. For the present, you should estimate one or more hourly rates that reflect what you believe is an approximate average for the

customers you are affecting, and multiply times an overhead factor. *Until OMB provides specific guidance, apply the same 0.48 total overhead factor that is specified for Federal workers.*

Costs to BLM customers should include any out-of-pocket expenses as well. For example, a change that requires more driving to consult records or obtain personal help imposes a mileage cost on the public. If some members of the public are "forced" to purchase a computer and internet service, those costs should be estimated.

Note that each of these costs has a mirror in the benefits column, and that the usual effect of automation projects is to reduce the paperwork-related burdens on the public.

3.1.4 Costs to Society

OMB cares about the impact of your project on U.S. citizens, particularly those within our borders. The main costs of a Government project a to non-customer citizens rise from the fact that the project costs are extracted from the economy by taxation, which reduces the money available for private purposes. The calculations associated with these effects are sophisticated and difficult, and will not tip the balance among alternative projects of the scale of BLM IT projects. We recommend that you ignore them.

However, the cost to society of diverting money from the private sector is reflected partially in the choice of discount rate you will make later in your analysis. As will be explained in Chapter 6, OMB prescribes different discount rates depending on the degree to which your project is "competing" with private sector investment. Selection of a suitable discount rate will account for most of the costs your project will impose on society as a whole.

3.1.5 Tangible vs. Intangible Costs

The absence of a profit motive in Government service encourages BLM project managers to assume that many costs (and benefits) cannot be quantified, and should therefore be labeled "intangible". This is often true, but a little effort can convert many "intangibles" to quantitative estimates.

Tangible costs are those costs that can be quantified. Whenever possible, costs should be expressed in dollars, to simplify comparisons. However, quantifications can be expressed in other units—for example, a 15 percent reduction in complaints, or a 4 percent improvement in employee turnover rate. If you can find a way to estimate the quantity of any cost or benefit, you can often find a way to convert that quantity to dollars.

When you have completed a list of intangible costs (for example, a reduction in public satisfaction), ask yourself, for each, "if this event really occurs, how would I know?" Often some indirect metric will suggest itself, and provide you a handle for quantifying the cost and thereby converting it to the "tangibles" column.

3.1.6 Shared Costs

In the spirit of including all the direct and indirect costs of a project in this analysis, you are expected to identify any portion of costs that you will share with another activity—whether or not you actually pay for your share of the shared resource. Examples include a substantial demand on existing or planned processing or storage capacity—say greater than 25 percent, as a rule of thumb. If you are purchasing servers that will place additional demand for their care and feeding on a central staff, you should take their estimate of your share of their total cost of providing the services, the infrastructure, and the facility. If you are depending on someone else for backup and recovery services, the costs should be estimated.

On the other hand, you do not have to account for all the costs of the development and operations environment of your project. The general rule is to account for costs that would not be incurred except for your project.

When you calculate shared costs, be sure to specify the unit cost of 100 percent of the resource, the percentage you are assuming, and the assumptions that support your estimate. If you have a sharing agreement, explain it in the assumptions section.

3.2 Focus on the Big Costs!

Your business case requires a detailed budget of direct project costs. That budget will provide many of your cost estimates for the financial analysis. However, the purposes of a benefit-cost or cost effectiveness analysis do not require that every possible cost or benefit be included—only those that make a difference in the decision at hand. For purposes of financial analysis, you only need to include the costs and benefits that are large enough to affect the benefit-cost ratio, or, in the case of cost effectiveness analysis, the comparison between alternatives.

Specifically, it is ok to exclude costs that affect every alternative equally—they are "a wash", and you should simply mention them in Chapter 6 of your Business Case. For the remaining costs, focus on those that make a difference in the results for each alternative. In many cases, you will discover that only 5-10 costs dominate the result so completely that all other costs can be excluded. If you can limit the cost categories this

way, your financial analysis will be shorter, easier to defend, and much more understandable to reviewers.

3.3 Place Costs Along a Realistic Timeline

It also matters in this analysis when a cost is incurred. Therefore, you need to distribute your costs by project year. For purposes of this financial analysis, it is sufficient to assume that all expenses are incurred at the end of each year in which they actually fall.

Plan by Government fiscal year. This will make it much easier to align your project with funding. Further, it will put all projects in the same fiscal framework, so that accurate comparisons are possible.

3.4 Should You Allow for Inflation?

It is notoriously difficult to estimate future inflation, and OMB recommends that you do not try, in most cases. Most IT projects can be analyzed without inflation, or, in "constant dollars". OMB recognizes that some projects, such as a large commercial lease with fixed, built-in inflation factors, may best be analyzed with inflated dollars ("current dollars").

Just don't mix them in the same analysis!

If you choose to use constant dollars, then do not "inflate" any cost category. That

includes Federal salaries, even though they increase at a fairly predictable pace. If you choose constant dollars, and a particular cost estimate is expressed with inflation included, you will have to back out the inflation using the interest equation described in Chapter 6.

Likewise, if you choose to use current (inflating) dollars, you will have to add in inflation for all future costs by using the interest equation and your best estimate of a general inflation rate. Circular A-94 points to the inflation assumptions in the President's annual budget (2% per year, through 2010, as of November 2000), as the most appropriate factors to use for this purpose. If you have to go beyond the period covered by the Budget assumptions, you are to extend the last year's projection. These inflation assumptions can be found in the current Budget, or a "Midyear Review" document, at http://w3.access.gpo.gov/usbudget/, which is the Government Printing Office site for the U.S. Budget.

For almost all BLM IT projects, you will be better off to choose constant dollars for your financial analysis.

3.5 Record Your Assumptions and Sources!

Your best judgment will be required dozens of times during this analysis—make sure you record, on the "Assumptions" sheet, how you decided on every significant number you have selected.

4 How Do You Figure the Benefits?

This section will help you identify what products and changes should be included as benefits in your financial analysis, and to quantify them.

4.1 What Qualifies as a Benefit?

The rules for benefits mostly mirror the rules for calculating costs—but benefits are usually harder to estimate. As with costs, OMB is concerned with the total future benefit to U.S. society, wherever and whenever realized.

"ROI and the Value Puzzle" describes Government-sector benefits as follows:

> "Benefits are defined as an advantage, profit, or gain attained. They are commonly thought of as an investment's return and should describe what the investment enables an agency to accomplish and how the mission is enhanced. Focusing on improved business outcomes rather than the technology is one of the best ways to ensure that the expenditure of any resource furthers the agency's mission."

This definition aligns perfectly with BLM efforts under the Bureau Architecture to ensure that IT investments are responsive to the needs of agency business processes. IT investments are to be made only when a clear business purpose is supported. (This includes maintaining the infrastructure that makes business possible.) "ROI and the Value Puzzle" says it this way: "Benefits should clearly answer the question, 'What does this investment provide the customer, public, or organization?'"

In the business of BLM, IT investments provide benefits in the form of (1) new or expanded products and services; (2) reduced costs to provide products or services, or avoidance of costs altogether; or (3) enhanced working conditions.

4.1.1 Benefits Realized by the BLM

The measurement of benefits usually entails a "before" and "after" determination, for some discrete unit of benefit. Therefore, the first step is to identify and define each improvement that you want to label as a separate benefit, and to obtain data to quantify the "before" condition you will improve with your project. The "after" condition is then estimated, based on documented assumptions, in terms of the same units of

measure. If you quantify an existing map-making process in terms of hours of GIS staff time to perform it, then you will want to show how the new method reduces or eliminates the labor hours—figuring both in hours by pay category, and the dollars they cost BLM. Where a new or expanded service is created, you will simply compare all benefits to all costs, since you are not improving on an existing process. (This won't come up very often, since the overall mission of the BLM is well established.)

Examples of benefits realized by the BLM include the following, adapted from "ROI and the Value Puzzle".

Table 4.1 Examples of Benefits

Benefit Category	Description
Improved ability to deliver services	New or expanded services can be delivered via new technology; or same services can be delivered faster. Benefits from the value of the new service to the public, and/or reduced BLM staff hours to deliver the service, and reduction of direct costs associated with current services.
Improved access to information	Internal and external customer access to information that formerly was unavailable, or required work hours, fees, and driving costs for the public, and work hours and material costs for the BLM.
Improved accuracy	Systematic reduction of new or existing errors in critical BLM data bases. Benefits to BLM in fewer work hours to assemble accurate reports, less money to revise work and to defend or compensate errors. Increased ability to share data across BLM, because of better, or better-characterized, data. Benefits to BLM customers in reduced work hours to obtain accurate information and correct erroneous information.
Improved compatibility with existing tools and infrastructure	Reduction of BLM work hours to create and maintain products that involve multiple authors or multiple data formats; reduction of IRM support costs; reduction of training time; increased ability to share with BLM partners, saving BLM and other work hours; standardization across agency to reduce work hours required to assemble regional or national plans and reports; benefit to the public in reduced hours to access standardized BLM products or services.
Improved effectiveness of information delivered	Reduction of BLM and BLM customer work hours to use products and services because of more effective organization or presentation of the information, as, for example, in a multimedia format.

Benefit Category	Description
Improved flexibility to realize future opportunities	Building a capability that may not be fully realized in the short run, but which lays necessary groundwork to realize other benefits later. Example is high-bandwidth interoffice communications, which would be used for limited purposes at first, but is necessary infrastructure for many future applications and architectural approaches.
Improved security and reduced risk of loss or file corruption	Infrastructure improvements that help ensure that many work hours will not be wasted by loss of product, that system administrators will not spend needless hours recovering from system corruption, and that sensitive information will not be compromised.
Improved system maintenance	Changes that simplify or streamline system maintenance, or that mean less-specialized staff are required for maintenance. Benefits cost of operations, but also may improve system availability to business users.
Improved reliability	Changes that increase system availability to business users, or prevent failures that could interfere with conduct of business.
Improved performance	End-to-end time for business processes is reduced, so that more output per staff hour may be realized. This may result from many kinds of improvements, including business process re-engineering to take better advantage of automation.
Improved working environment	Better visibility and presentation, greater physical comfort or avoidance of physical strains, resulting in higher staff productivity and reduced staff injuries.

Another source of "benefit" is salvage value. Salvage value (for our purposes here) is the dollar "value in use" of an asset at the end of your selected period of analysis. If, for example, you purchase a large server in the middle of a three-year project analysis period, the value of that server to BLM at the end of the third year is the benefit. The "value in use" should not be confused with "value in exchange", which is the price at which BLM could actually sell the asset. In the IT world, it often happens that an asset is not legally transferable or marketable, but nonetheless provides functionality that has some dollar value to the BLM.

Salvage value is often hard to estimate. One method you might consider is to depreciate the value of the asset on a straight line over the planned life in service of the asset. If a large server is expected to be taken off-line after four years, it would lose three-fourths of its value by the end of a three year analysis period. Whatever approach you choose, be sure to document your assumptions on the "Assumptions" spreadsheet.

Estimating your benefits will probably be the hardest task you perform for this financial analysis. Do not expect to do the whole job in one sitting, or alone. What works best is to brainstorm your benefits with the project team and user representatives. A good sequence to follow is:

1. Work first on identifying possible sources of benefit
2. Then clear up overlaps and duplications among them and create a list of discrete benefits
3. Decide judgmentally which benefits are likely to be big enough to matter in your analysis
4. Brainstorm how to quantify the "before" and "after" for each benefit—what information do you need in order to make a decent estimate
5. Go get the information
6. Build the "Benefits Calculation", "Current Costs", "Future Costs", and "Assumptions" spreadsheets for each benefit and each alternative where they apply.
7. Pass your assumptions and information back to the source business community and the business process owner to get confirmation. This confirmation should be documented in the "Assumptions" sheet, as part of explaining your sources. There is no validity to asserting some business benefit will occur, if the business programs do not agree or intend to modify their practices according to your expectations.

The time and staff energy you spend on benefits estimation now will be repaid many times over as you justify and re-justify your project to various audiences throughout its life-cycle. If you short-change the work now, you will be forced to re-visit the issue many times.

4.1.2 Benefits Realized by the Government

A BLM investment may also benefit some other part of the Government, and such benefits should be identified and estimated if they are significant decision factors. (You will probably want to identify such benefits in your Business Case text, whether or not they are large enough to warrant inclusion in the financial analysis.) An example might be providing a partner agency, like the Forest Service, with direct and efficient access to BLM land status information. You will have to get help from the benefiting organization—this cannot just be an act of imagination, but must include the same level of information and confirmation you obtain for BLM business benefits. Document this information in the "Assumptions" sheet.

4.1.3 Benefits Realized by BLM's Public Customers

This category includes benefits that BLM customers (or customers of other agencies) receive directly, such as easier access to maps or data, simpler application forms, or lower fees. (Indirect benefits, which result from more effective BLM work processes, are covered in 4.1.1 above.) These benefits are associated with the "external" type of project, which changes in some way the nature of the customer's encounter with the BLM. To identify these benefits, you might brainstorm about the ways different types of BLM customer interact with the BLM—in person, by mail, by phone, by e-mail, or on the Internet—and ask how your project would reduce the time required for those interactions. If customers of partner agencies will benefit, estimate and include those benefits. When thinking about the time savings, don't forget the driving time and expenses saved by letting customers work remotely, or the time saved when correct information is provided the first time. Convert these time savings to dollars, and you may well find they are the predominant benefit of your project!

4.1.4 Benefits Realized by Society

Benefits received by society at large (citizens who are not direct customers of BLM or the Government) may be very hard to identify for typical small-scale IT projects, but you should at least give this a thought as part of your sessions to identify benefits. These benefits are usually macroeconomic in nature, and far beyond the level of sophistication that is appropriate for financial evaluation of BLM IT projects. If nothing else, asking your team to try to identify some benefits to U.S. society at large may uncover some previously-missed benefits to BLM customers.

4.1.5 Tangible vs. Intangible Benefits

Time for some tough talk: Benefits are not "intangible" just because they are hard to quantify. IT projects are undertaken to make tangible improvements in the business operating environment, not for indefinite, intangible reasons. Those tangible improvements are intended to increase reliability, availability, business support, or another quantifiable characteristic of the Bureau's IT architecture.

Much is made of the fact that the Government is not in a profit-making business. Presumably, therefore, Government should not be asked to quantify the benefits of new activities or proposals. OMB concedes in Circular A-94 that this sometimes is true, but explains that you can usually find a way to translate a seemingly intangible benefit into something measurable—in units if not in dollars. Of course, such estimates always incorporate assumptions, but assumptions that are developed with the business representatives who are most involved are likely to be reasonable. Simply record them

in the "Assumptions" sheet of your financial analysis, and make sure your business representatives accept them as reasonable.

To convert intangibles to tangibles, ask yourself: "how you would know if this intangible benefit actually came to pass?" Happier customers—fewer complaints, fewer lawsuits, fewer personal visits to clear up problems—lower BLM and public labor cost. Nicer user interface—less staff fatigue, fewer staff errors, less sickness—lower BLM labor cost. How much less? Get data where you can, or make assumptions on a unit basis, and multiply by the number of occurrences in a year.

Of course, if the dollar value of these intangibles is not a major factor in determining total benefits, you need not go to the trouble of quantifying them. This presumes that you have adequate tangible justifications for the project from other sources.

4.1.6 Shared Benefits

It is possible, although uncommon, that you may have to share a benefit with another, complementary project. For example, your project may be one of two infrastructure improvement projects that, taken together, permit the BLM to realize a certain benefit. In this case, you must agree with the other project managers on a split of the benefits, and assign to your project only your share of the benefit. Otherwise, the BLM would double-count the benefit in its investment analysis, and each of the complementary projects would appear to return more benefit than is realistic.

Calculate shared benefits on the same sheets used for all benefits, but apply and document the sharing factor you have adopted.

4.1.7 Common Pitfalls in Figuring Benefits

There are several ways you can stumble when figuring benefits. The following are seen often:

1. Overlapping benefits—if you fail to separate your sources of benefit into mutually-exclusive, discrete bins, you may find yourself double-counting benefits.
2. Exaggerated current costs—be careful, when calculating the "current cost" of doing business that you do not inadvertently exaggerate the amount now spent. In many cases, the current way of doing business is so clumsy that field personnel have developed major shortcuts, or simply get along with less information. Do not calculate how much it would cost them to "do it right", but rather, estimate how much they really spend.
3. Fanciful benefits—make sure that your benefits, and the assumptions used to quantify them, pass the "laugh test" with a representative slice of BLM business

staff. Do they agree that these benefits truly will come to pass, or do they believe other impediments will stymie improvements? The analysis is not about "possible benefits—in your dreams", but rather "probable benefits."

4. Contingent benefits—if realizing a benefit first requires another office or organization to make another change, and that change is not extremely likely, then you need to label the benefit accordingly, and exclude it from your main analysis.

4.2 Focus on the Big Benefits!

The financial analysis should not be cluttered by insignificant sources of benefits. Just as minor costs can be ignored, so should you ignore benefits that obviously will not noticeably affect the benefit-cost ratio or the choice among alternatives. Usually, the top 5-10 sources of benefit will determine the final result. As a suggestion, if varying the amount of a benefit by 50% plus/minus would not change the first decimal place in the benefit-cost ratio, or cause the net present value (Chapter 6) of two alternatives to move within 10% of each other, don't waste your time on further detailed analysis. A compact financial analysis that focuses on the big costs and the big benefits will be understood and accepted most readily.

4.3 Place Benefits Along a Realistic Timeline

Like costs, benefits need to be assigned to the year in which they are actually realized. Normally, the year will be defined as the Government fiscal year, and the benefits technically assigned to the end of each year. Assigning benefits to a timeline is necessary for required discounting.

4.4 Record Your Assumptions and Sources!

Your best judgment will be required dozens of times during this analysis—make sure you record, on the "Assumptions" sheet, how you calculated every benefit.

5 The Summary Worksheets For Benefits and Costs

5.1 Summary Sheet for a Benefit-Cost Analysis

Page 1 of the "Benefit-Cost Summary Sheet" from the benefit-cost template is reproduced as Figure 5.1. On this front sheet of your financial analysis will appear all the "answers". The calculations and presentation of results is summarized below, referenced by the Excel column-row numbers. Note that only cells B25 and B27 are supplied by the user; all others are copied from other sheets, or are calculated here, automatically.

Figure 5.1 Benefit-Cost Summary Sheet

	A	B	C	D	E	F	G
1	**Project Costs**	**Total**	**FY2001**	**FY2002**	**FY2003**	**FY2004**	**FY2005**
2	Yearly Direct Project Costs		$0	$0	$0	$0	$0
3	Yearly Indirect Project Costs		$0	$0	$0	$0	$0
4	Yearly Shared Costs		$0	$0	$0	$0	$0
5	Yearly Cost Totals		$0	$0	$0	$0	$0
6	Total Project Cost, All Years	$0.00					
7	Present Value of Yearly Cost Totals		$0	$0	$0	$0	$0
8	Present Value of Total Project Cost	$0.00					
9							
10	**Project Benefits**						
11	Yearly Tangible Benefits		$0	$0	$0	$0	$0
12	Total of Yearly Tangible Benefits	$0.00					
13	Yearly Salvage Value		$0	$0	$0	$0	$0
14	Total of Yearly Salvage Values	$0.00					
15	Total Benefits and Salvage		$0	$0	$0	$0	$0
16	Total Project Benefits, All Years	$0.00					
17	Yearly Present Value of Benefits and Salvage		$0	$0	$0	$0	$0
18	Total Present Value of Benefits	$0.00					
19	**Net Present Value**	$0.00					
20	**Benefit/Cost Ratio**	**#DIV/0!**					
21	**Calculation of Breakeven Year**						
22	Discounted Cumulative Benefits		$0	$0	$0	$0	$0
23	Discounted Cumulative Costs		$0	$0	$0	$0	$0
24	Payback Differences		$0	$0	$0	$0	$0
25	**Breakeven Year**	**20XX**					
26							
27	Discount Factor per Circular A-94 (See Assumptions)	0.000					
28							
29	Figures in red must be supplied by the user.						

Columns C-L: Columns for each of 10 analysis years—use the columns necessary to match your analysis period (only years 1- 5 are shown here). For a FY2002 project start date, shift the dates to the left one year, and so forth for later starts.

Rows 2-8: Calculation of all costs, yearly and totals for the analysis period.
Rows 2-3: Yearly totals from "Project Costs" sheet, separately for direct and indirect costs.
Row 4: Yearly totals for all shared costs, from "Shared Costs" sheet.
Row 5: Yearly cost totals for all types of costs (sum of rows 2-5).
Cell B6: Total cost of the project, all years combined (sum of row 5 yearly totals).
Row 7: Present (discounted) value of yearly total costs (row 5 yearly totals reduced by the discount factor).
Cell B8: Present value of the total project cost (sum of the row 7 discounted values of the yearly total costs).
Row 11: Yearly totals of all tangible benefits, referred from the "Benefits Calculation" sheet.
Cell B12: Total of all project benefits for the entire 10 years (sum of row 11 total yearly benefits).
Row 13: Yearly salvage value from the "Benefits Calculation" sheet.
Cell B14: Total of all yearly salvage values from row 13.
Row 15: Yearly totals of benefits and salvage value (rows 11 and 13).
Cell B16: Total of all project benefits and salvage value.
Row 17: Yearly Present Value of benefits and salvage value.
Cell B18: Total Present Value of all benefits and salvage value.
Cell B19: The Net Present Value of the project, which is simply the present value of the total benefits minus the present value of the total costs.
Cell B20: **Benefit/Cost Ratio**—what this template is all about—is expressed here as net present value of benefits divided by the net present value of costs, to one decimal place.
Rows 22-24: Calculations you need in order to figure out the Breakeven Year, when the total of benefits returning from your project will first exceed the total of costs expended on the project.
Row 22: Discounted cumulative benefits are just the yearly benefit totals in row 17 added successively, so that the cumulative total grows year-by-year by the amount of the previous year's benefits. Note that this is the discounted, or present value, benefit total.
Row 23: The same thing for the discounted yearly cost totals of row 7.
Row 24: The running difference, year-by-year, between the cumulative total benefits that your project has returned, and the cumulative total costs that your project has incurred. It commonly takes 2-4 years for the cumulative benefits to exceed the cumulative costs of an IT project.
Cell B25: Breakeven year—you identify the breakeven year visually, by simply noting the year in which cumulative benefits exceed cumulative costs, and entering that year in row 25.
Cell B27: Cell B27 is a parking place for the discount factor you have used wherever it is required discounting. The Excel equations refer to this cell to obtain that factor, so any revision of your discount factor needs to be made only here.

It will repay your effort to study the "Benefit-Cost Summary Sheet" carefully—examining the equations that govern the calculation described above. Once you thoroughly understand the intended content of each row, and how it is referred from other worksheets and how it is calculated, you will be well prepared to modify those other worksheets correctly.

5.2 Summary Sheet for a Cost Effectiveness Analysis

Page 1 of the "Cost Effectiveness Summary Sheet" from the cost effectiveness template is reproduced as Figure 5.2. On this front sheet of your cost effectiveness analysis will appear the "answer", expressed as the "Net Present Cost" of this alternative. Because no benefits are calculated and there is no benefit-cost ratio or breakeven year to be figured, this summary sheet is much simpler than the benefit-cost analysis template. The calculations and presentation of results is summarized below, referenced by the Excel column-row numbers. Note that only cell B15 is supplied by the user; all others are copied from other sheets, or calculated here, automatically.

Columns C-L: Columns for each of 10 analysis years—use the columns necessary to match your analysis period (only years 1- 5 are shown here). For a FY2002 project start date, shift the dates to the left one year, and so forth for later starts.

Rows 3-7: Calculation of all costs, yearly and totals for 10 years.

Rows 3-4: Yearly totals from "Project Costs" sheet, for direct and indirect project costs.

Row 5: Yearly totals of the direct and indirect costs.

Row 6: Present value of each yearly cost total.

Cell B7: Total of the present values of costs for all years.

Rows 8-11: Calculation of Salvage Values—these are subtracted from the project costs, because they return some of your initial investment at the end of the analysis period.

Row 9: The salvage value from each year, brought up from the Salvage Value section of the "Cost and Salvage Value" sheet.

Row 10: The same values, adjusted to present value.

Cell B11: The total of the present values of all salvage values.

Row 12: **Net Present Cost**—what this template is all about—is calculated as the net present value of salvage, subtracted from the net present value of total costs, or cell B12 minus cell B11 on the template. Note that "net present cost" is just "net present value" with the sign reversed for clarity.

Cell B15: Cell B15 is a parking place for the discount factor you have used wherever it is required. The Excel equations refer to this cell to obtain that factor, so any revision of your discount factor needs to be made only here.

Figure 5.2 Cost-Effectiveness Summary Sheet

	A	B	C	D	E	F	G
2	**Project Costs**						
3	Yearly Direct Project Costs	$0	$0	$0	$0	$0	$0
4	Yearly Indirect Project Costs	$0	$0	$0	$0	$0	$0
5	Total Costs (Undiscounted)	$0	$0	$0	$0	$0	$0
6	Present Value of Yearly Cost Totals		$0	$0	$0	$0	$0
7	Total of Present Value of Yearly Cost Totals	$0					
8	**Salvage Value**						
9	Yearly Salvage Value		$0	$0	$0	$0	$0
10	Present Value of Yearly Salvage Values		$0	$0	$0	$0	$0
11	Total of Present Value of Yearly Salvage Values	$0					
12	**Net Present Cost**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
13							
14							
15	Discount Rate per Circular A-94	0.0000					
16	(see Assumptions)						
17							
18							
19	Figures in red must be supplied by the user.						

6 What About Discounting?

Sprinkled throughout this the earlier sections of this document are references to "discounting" and "present value"—along with the note that discounting will be covered in Section 6. We have arrived at Section 6. Discounting is a simple idea, but one that is cluttered with economist-speak. While it might be feasible to simply state here what equation to use in which cells of the template, this section will present enough of the underlying concepts and terms that you will understand the calculation, and be prepared to ensure no errors are introduced into your spreadsheets.

6.1 What is Meant by the "Time Value of Money"?

Free Enterprise is based on two reliable human preferences: "more is better than less", and "sooner is better than later". No matter how complicated, a financial analysis of project alternatives is just a systematic way of deciding which alternative provides the most, soonest. To decide which alternative returns the most value, you just have to subtract costs from benefits. However, the additional desire to get the return soonest requires that the financial analysis weight the costs and benefits by a factor that varies according to how long you have to wait.

The "time value of money" is the measure of how important to you it is to receive a benefit sooner than later (or to put off a cost longer). Compound interest on your savings account is the simplest example. The interest rate you earn is precisely equal to the time value of your savings to you. You have made a deal with the bank: you will forego access to your savings into the future, as long as the bank pays you extra for your sacrifice. The amount you have agreed upon is called the interest rate. Another way of saying this is that if the bank is going to use your $100 for ten years, you expect to get back more than $100 at the end of that period, or else you will just spend the money now.

Figure 6.1 shows an example of how your savings would grow if you were earning 10% annual compound interest (!). At the end of the first year, your $100 will have earned 10 percent of $100, or $10. So at the beginning of year 2, you have $110 in the bank. During the whole of year 2, then, you will earn 10% of that whole $110, or $11. Added to $110, your new savings total, the principal, is $121starting into the third year. At the end of 10 years, the table shows that your savings will be worth $259.

Figure 6.1 Compound Interest in Action

Year	Initial $$	Factor	Value, Year-End
1	**$100.00**	1.1000	$110.00
2	$100.00	1.2100	$121.00
3	$100.00	1.3310	$133.10
4	$100.00	1.4641	$146.41
5	$100.00	1.6105	$161.05
6	$100.00	1.7716	$177.16
7	$100.00	1.9487	$194.87
8	$100.00	2.1436	$214.36
9	$100.00	2.3579	$235.79
10	$100.00	2.5937	**$259.37**

So far, this is the stuff of daily life. But now turn it upside down. What if I told you I would pay you $259, but not until the end of 10 years? How much is that $259 worth to you today?

Well, it sure isn't worth $259 to me today, because if I had $259 today, and put into that same 10% CD, it would be worth way over $500 in 10 years, because it would earn interest all that time. So why don't I just figure out how much money I would have to put into a CD today in order to equal $259 in 10 years?

Table 6.2 shows how that works. All you do is divide by the interest rate rather than multiply. If you start with $259 at the end of year ten and take away the 10% interest it would have earned during the tenth year, you see that it is then worth only $235. Working back to the beginning of year one in this way, you find that the ***present value*** of $259, to be received 10 years in the future, assuming a 10% ***discount rate***, is exactly $100.

Discounting is just interest in reverse. The present value of a future benefit is the amount of the benefit reduced by the amount of interest you could have earned on that money if you had it starting today.

The main use of discounting in financial analysis is to level the playing field between alternatives that will return benefits in different years, or that will incur costs in different years. Given two alternatives, one that returns $1,000,000 to you after 5 years, and another that returns $1,000,000 after 10 years, you would prefer the first, because the discounted, or present, value of $1,000,000 received in 5 years is much greater than the discounted, present value of $1,000,000 received in 10 years. Likewise, you would normally favor an alternative that put off expenses farther into the future.

Figure 6.2 Discounting Is Just Interest, In Reverse

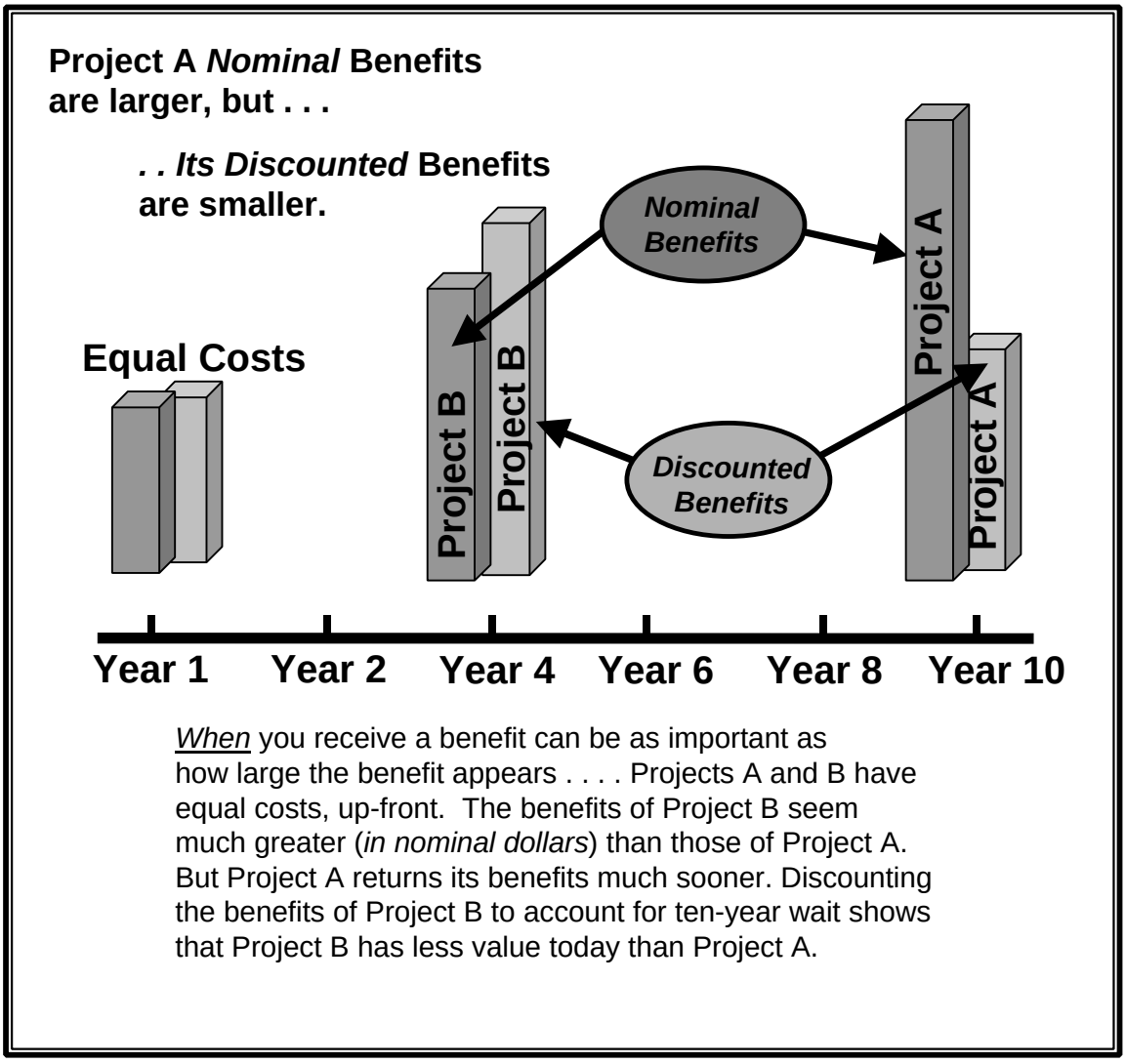
Year	Initial $$	Factor	Value, Year-End
1	**$259.37**	1.1000	$235.79
2	$259.37	1.2100	$214.36
3	$259.37	1.3310	$194.87
4	$259.37	1.4641	$177.15
5	$259.37	1.6105	$161.05
6	$259.37	1.7716	$146.41
7	$259.37	1.9487	$133.10
8	$259.37	2.1436	$121.00
9	$259.37	2.3579	$110.00
10	$259.37	2.5937	**$100.00**

The analysis gets much more interesting when your alternatives have benefits of different sizes arriving in various future years, mixed in with various costs that are incurred at various times. To compare all these apples and oranges, you first calculate the present value of every benefit and every cost, which removes the time issue from the comparison. Then the total present value of all costs can be subtracted from the total present value of all benefits for each alternative to determine ***the net present value*** of that alternative. The alternative with the greatest net present value is favored economically. (Or divide benefits by costs to get the ***benefit/cost ratio***—this removes the dollar magnitudes from the comparison of alternatives.)

Figure 6.3 illustrates how discounting future benefits and costs puts very different alternatives on a level playing field.

The size of the discount factor you choose obviously will have an impact on your results. A very low discount factor will minimize the difference between alternatives that deliver benefits in different years. Conversely, a large discount rate will tend to eliminate alternatives that provide a much later return on the up-front investment of costs. The selection of your discount factor is governed by OMB guidance and your judgment. It will be discussed in more detail in Section 6.3.

Figure 6.3 Discounting Applies the Time Value of Money to Project Comparisons



6.2 The Arithmetic of Interest and Discounting

The arithmetic of interest and discounting is simple, and easy to apply in a spreadsheet formula. You have to get it right, however, so the following description is thorough and a little boring. It is explained in terms most relevant to BLM financial analysis—"years" instead of "period", and assumes that you will always count a cost or benefit as occurring at the end of a year, once a year only. The formula will work for more complicated cases (like the monthly payments on a 30-year house mortgage, for example), but you will not have to deal with such complications.

Calculation of Compound Interest: The formula for figuring out the future value of an investment that will earn a certain interest rate works like the example given above. At the end of the first year, the investment should be worth the initial amount plus interest, which is the principal amount times the interest rate. As shown back in Table 6.1, the value of $100 invested at 10% at the end of the first year is $110. Then, *because we add our interest earnings into the principal amount*, the second year's interest is equal to the new, larger principal amount times the 10% interest rate.

Putting this as a formula, at the end of the first year, the value of your investment can be calculated as Value = Principal X $(1+i)^1$, where "i" is the annual interest rate. That is, the value at the end of the first year is the starting principal amount times a factor of 1 plus the interest rate, raised to the 1^{st} power. The factor $(1+i)^1$ just says that you take the principal amount (the "1") plus the interest rate (for example, .10), and raise it to the 1^{st} power (which leaves it unchanged, equal to (1+i)). That is a complicated way to say that you multiply the principal amount by 1.1 to get the year-end value. But to get the value at the end of 2 years, all you have to do is change the exponent in that factor to "2". So the value of a principal amount at the end of 11 years would be Value = Principal X $(1+i)^{11}$—likewise for any other analysis period. (Refer to Figure 6.4.)

Calculation of Present (Discounted) Value: To figure the present value of a payment that will occur at the end of "n" years, just divide the amount of that payment by the factor $(1+i)^n$. For example, the present value of a $250,000 payment to you, which you will receive at the end of 30 years, and using a discount rate of 8%, would be only about $25,000 [$\$250,000 \div (1+.08)^{30}$]. In Excel, this is written as 250000/(1+.08)^30. (Refer to Figure 6.5.)

Figure 6.4 The Arithmetic of Interest

Going UP!

Year	Initial $$	Factor	Value, Year-End
1	**$100.00**	1.1000	$110.00
2	$100.00	1.2100	$121.00
3	$100.00	1.3310	$133.10
4	$100.00	1.4641	$146.41
5	$100.00	1.6105	$161.05
6	$100.00	1.7716	$177.16
7	$100.00	1.9487	$194.87
8	$100.00	2.1436	$214.36
9	$100.00	2.3579	$235.79
10	$100.00	2.5937	**$259.37**

The increase in value of a principal amount ($100 in this example) can be calculated by multiplying the principal times (1 + the interest rate), raised to the power of how many years the interest will be earned:

$$\text{Value} = \text{Principal}\ (1 + \text{interest rate})^{\text{years}}$$

OR, IN THIS CASE

$$\text{Value} = \$100\ (1 + .10)^{10}$$
$$\text{Value} = \$259.37$$

Figure 6.5 The Arithmetic of Discounting

Going DOWN!

Year	Initial $$	Factor	Value, Year-End
1	**$259.37**	1.1000	$235.79
2	$259.37	1.2100	$214.36
3	$259.37	1.3310	$194.87
4	$259.37	1.4641	$177.15
5	$259.37	1.6105	$161.05
6	$259.37	1.7716	$146.41
7	$259.37	1.9487	$133.10
8	$259.37	2.1436	$121.00
9	$259.37	2.3579	$110.00
10	$259.37	2.5937	**$100.00**

The discounted value of a future amount ($259.37 in this example) can be calculated by dividing the future amount by (1 + the interest rate), raised to the power of how many years in the future the amount will be received:

$$\text{Value} = \text{Principal} / (1 + \text{interest rate})^{\text{years}}$$

OR, IN THIS CASE

$$\text{Value} = \$259.37 / (1 + .10)^{10}$$
$$\text{Value} = \$100$$

These examples beg the question, how do you know what discount factor to use? Section 6.3 will provide some guidance.

6.3 Current Dollars or Constant Dollars?

One of your early decisions in this analysis has to be whether you will figure everything

in current dollars or constant dollars. Current dollars ("nominal") reflect the impact of inflation over the years of your project. Like the dollar bills sewn into your mattress, a dollar loses buying power over time at the annual rate of inflation. Constant dollars, called "real" dollars by economists, have had the effect of future inflation removed. That is, all the arithmetic is done as if there were no inflation. For example, if inflation is 3 percent every year for ten years, a future benefit or cost of $1,000,000 in future dollars is worth only $745,000 in constant year 2000 dollars. This is exactly the same process and exactly the same arithmetic used in the examples above to discount future values—only the factor used is the estimated inflation rate, not the alternative rate of return. Conversely, you can multiply by the $(1+i)^n$ factor in order to convert constant dollars to current (inflated) dollars in any future year.

BEWARE: ECONO-SPEAK

Constant Dollars = "Real" Dollars = no inflation

Current Dollars = "Nominal" Dollars = inflated dollars

In theory, you can do your whole analysis in either current or constant dollars. Just be sure never to mix them up in one analysis. Either way, you will probably have to convert some current dollar estimates to constant dollars, or vice-versa, before you start adding them up.

OMB encourages you to use constant dollars for most analysis. The exceptions, as they see it, are situations like long-term leases that have inflation built into the annual cost quotes, or other situations where major costs or benefits are quoted to you in inflated dollars.

Constant dollar analysis is easier most of the time. You don't have to inflate salaries for future raises, or worry about price increases in software upgrades and the like. Furthermore, predicting future inflation is difficult. If you can't avoid predicting inflation, look to the guidance that was cited in Section 3.4. Like the Circular A-94 factors, that guidance may be revised at the beginning and middle of each calendar year.

You can see how desirable it is to stay out of the inflation business in your financial analysis.

6.4 What Discount Factor Should You Use?

The example given above shows that the present value of $250,000, received 30 years from now, is only $25,000 if you use an 8% discount factor. On the other hand, if you had assumed a discount rate of 3%, that $250,000 would have a present value of over $100,000. How do you pick the best factor?

To extend this example, imagine the problem facing you after you just won $250,000 in the Parsimony State Lottery. You now have to choose between getting the whole amount of the prize, spread over 30 years ("Annuity"), or getting a much smaller up-front cash payment (40% of the face amount, or $100,000). Which way should you go? From the example above, you can see that if you believe you can earn more that 3% compound interest per year for the 30 years, you will do better to accept the up-front cash payment. If you would average less than 3% return on your private investment of the cash, you would be better off to let the state dole out the money to you over 30 years. The judgment you have to make is how much you could earn on the cash, versus the (implied) interest rate the state gives you (3%). (Of course, this example ignores the tax, inflation, and re-investment considerations that would cloud your real-life decision!)

Conversely, if you are spending a pile of money now, to receive some benefit in the future, you should ask yourself how big that future benefit has to be, in order to exceed the amount you could earn just by investing that money in CDs or mutual funds.

These examples show how critical the selection of a discount rate is to determining how your financial analysis will come out, particularly if you have alternatives with very different timing of costs and benefits, and a long analysis period.

In many situations, OMB guidance just tells you what factor to use. Other times, OMB points the way, but expects you to form a judgment. So how do you choose a discount factor?

The economist will tell you that the discount factor should be the same as the interest rate you could get on the money if you invested it wisely elsewhere. This is called your ***"alternative rate of return"***. When you read OMB Circular A-94, you will see that their recommendations of discount rates are derived from their best estimate of what the Government has to pay for use of the money you will spend on this project. In other cases, it is based on their estimate of what alternative uses of the money could have yielded, if invested out in the private economy instead of being taxed away from the public.

As a rule, then, follow the guidance of OMB Circular A-94 for your type of project, and in those cases where OMB tells you to estimate your own discount factor, consider and justify your selection based on the alternative rate of return for the project cost

investment.

The following sections summarize OMB guidance for selecting your discount rate. It differs for benefit-cost analysis and for cost effectiveness analysis, and for constant dollar and current dollar analysis. Also, it differentiates between projects that are "internal" to Government operations, and those that are "external", and thus provide a direct benefit to the public.

6.4.1 Factors for Benefit-Cost Analysis

For each situation, OMB recommends a "real discount rate", to use in constant dollar analysis, and a "nominal discount rate", to use with current, inflated dollar analysis. In general, the nominal discount rate is equal to the real discount rate plus your annual inflation factor. Reducing a future benefit or cost by the real discount rate accounts only for the time value of money. Reducing a future benefit or cost by the sum of the real discount rate plus inflation accounts for both the time value of money and the loss of buying power of future dollars.

The following discussions provide the basic OMB guidance in the least complicated form. After you understand where your project fits into this breakout of rates, return to Section 8 of Circular A-94 and review the more subtle recommendations that may affect your final answer. However, you will not go far wrong following the simplified guidance summarized here.

OMB Guidance for Internal Projects

If your project aims purely to decrease the Government's cost of doing business, or increase Federal revenue, the project is "internal". For example, you may be upgrading the LAN in an office to a higher grade of cabling. In such cases, OMB recommends that you discount according to the Treasury borrowing rate on marketable securities applicable to the maturity period closest to your overall analysis period. Fortunately, these rates are provided to you in Appendix C of Circular A-94, in separate tables for nominal and constant dollar analysis. These are official, and are updated every January (the up-to-date values will be in the current downloadable version of A-94 on the web site cited earlier.) OMB recommends using this rate because it is a good approximation of what it costs the Government to get the money you need for your project. In 2000, the current dollar (nominal) rates vary from 5.9% to 6.3%; and the constant dollar (real) rates from 3.8% to 4.2%.

OMB Guidance for External Projects

Any project that "touches" the public or the private sector is subjected to a tougher test of whether the Government should do it. This test is a higher discount rate. To quote

Circular A-94:

> "In general, public investments and regulations displace both private investment and consumption."

What this comes down to is that you are competing with the private sector. It would be unfair to compete with the private sector using "cheap money"—that is, using a discount rate in your analysis that reflects only how much the Treasury has to pay to borrow cash. So, OMB directs you to use a higher discount rate, one that will more nearly match the interest a private company would have to pay to borrow the project costs. If it is then, still, more cost-effective to do the project in the Government, you are OK.

This is a consistent theme in OMB guidance. For example, you are expected to follow OMB Circular A-76 guidance for calculating the full costs of Government labor and contractor costs. This is because Circular A-76 is all about ensuring that projects will be outsourced to the private sector if a fair cost comparison shows it is less expensive (and the work is not an "inherently Governmental function"). Circular A-76 provides the information you need to place Government and contract job performance costs on a level playing field. Circular A-94 requires that you place the cost of project funding on a level playing field, by choosing a discount rate that matches what industry has to use.

If your project is "external", then OMB guidance says to use <u>at least</u> a 7% discount rate, for real (constant) dollar analysis. Seven percent is another number that OMB revises in Circular A-94 from time to time, depending on trends in the "marginal pretax rate of return" in the private sector. OMB presents other subtleties and advice, which are generally outside the scope of BLM IT project analysis. <u>Use 7% for any external project, unless you believe have a reason to go higher</u>.

If your project is external, and costs are figured in current (inflated) dollars, you should add the specified inflation rate to 7%. (See section 3.4.)

To qualify as "external", a project might "touch" the public by providing a direct service that could conceivably be provided by a private company; or the project can compete directly with private sector service or product providers. For example, a project to provide on-line maps of Bureau recreation areas to the public clearly qualifies as an "external" project, because a private sector company could also develop a similar service. Developing software in-house, using Government personnel, normally would qualify, since you might be directly displacing a potential private sector business. From these examples, you can see that a very high proportion of BLM IT development projects are "external", and should be evaluated using the 7% discount rate.

But using a higher discount rate is not all that Circular A-94 requires. If your project is external, and is not justified on cost-savings grounds, you are required to perform a

"supplementary" analysis to recalculate your benefit/cost ratio after multiplying all your costs by 1.25. The purpose of this analysis is to account for the "excess burden" on the U.S. economy that results from taxing the money away from the private sector. Again, this is in addition to the use of a higher discount rate. You can perform this analysis in a separate copy of your Excel Workbook for each alternative. (This is described in Section 11, Circular A-94.)

6.4.2 Factors for Cost Effectiveness Analysis

It was explained in section 1.2 that there are situations when it is sufficient to do a cost effectiveness analysis, which shows which alternative way of accomplishing a goal is least expensive in the long run. To qualify, the goal has to be fixed, and mandatory, and the project must qualify as "internal" to the Government. The product of your effort has to be functionally the same, no matter how you go about getting there. Because the goal is fixed, there is no point in quantifying benefits—the benefit is identical for any alternative, so that all that matters is cost. However, this type of fixed and mandatory objective is unusual in BLM IT projects, because most projects are not mandatory, and their alternatives produce different benefits.

OMB Guidance for Internal Projects

If your project qualifies as both "internal" and as suitable for cost effectiveness analysis, OMB Circular A-94 directs you to use the rates in Appendix C of A-94, described above in section 6.4.1.1. Simply pick the discount rate for your financial analysis period from the appropriate tables for constant and current dollar analysis.

OMB Guidance for External Projects

Few, if any, BLM IT projects will qualify as both external and appropriate for cost effectiveness analysis. However, external projects that are appropriate for cost-effectiveness analysis should use the 7% discount rate cited above, for constant dollar analysis. For current dollar analysis, use 7% plus the inflation rate obtained from the Administration's budget assumptions (Section 3.4 above).

6.5 Explain Your Reasoning

You will have to make a number of choices and judgments that relate to time value of money. Explain them on the "Assumptions" worksheet for each of your alternatives, and explain them in Section 6 of your Business Case. It would be helpful to reference particular portions of Circular A-94 or this document, in case there is confusion about a particular statement. This will help focus SCO reviewers on authentic issues.

7 What Happens If You Guessed Wrong?

The SCO Business Case Template requires that you analyze (in section 6 of the Business Case) the sensitivity of your financial case. This section explains what that means.

7.1 The Purpose of Sensitivity Analysis

A sensitivity analysis shows what happens to the results of your financial analysis if some of your assumptions were too high or too low. The purpose of doing a sensitivity analysis is to increase confidence in your reviewers (and in you!) concerning the correctness of your choice of alternatives, even though some of your estimates might be wrong.

To accomplish this purpose, a good sensitivity analysis will test the result of reasonably possible errors in those cost and benefit assumptions that really could make a difference. In this respect, there is no point in testing out the effect of errors in numbers that aren't big enough to swing the results no matter how wrong you are. Just as for the selection of costs and benefits to include in the analysis in the first place, you should pick out the 1-5 variables that appear to be worthwhile testing.

7.2 The Tie To Risk Analysis

There should normally be some correspondence between the variables you test in the sensitivity analysis, and some of the risks you cite in your risk analysis (also in section 6 of the Business Case). For example, if there is a significant risk that you have underestimated the contractor labor required to program and test a new application, the potential impact of that risk should also be tested in your sensitivity analysis. If you underestimated contract labor by 50%, what would happen to your benefit-cost ratio, and you choice of alternatives? Not every risk can be tested in the financial analysis, but you should make a conscious cross-check to make sure your sensitivity analysis and your risk analysis line up.

7.3 How Do You Calculate Sensitivity?

Fortunately, you have already done 95% of the work required to perform the sensitivity analysis. All you need to do is plug higher or lower numbers into your Excel®

workbook for each alternative, and read the answer off the "Benefit_Cost_Summary_Sheet" or "Cost Effectiveness Summary Sheet". Document the nature and results of each sensitivity test you perform this way, in Chapter 6 of the Business Case. There is no need to create and save an additional copy of your financial analysis for each sensitivity test, although you may choose to do so. Just record your findings in the Chapter 6 discussion. Reviewers will be most interested in the choices you make and the explanation you provide, and can readily confirm whether your workbook is producing correct answers.

An example of sensitivity analysis was developed using the Benefit-Cost Example provided on the SCO intranet site, along with the financial analysis templates (**http://web.blm.gov/internal/wo-500/sco/sco_procedures.htm**). In that example, one key assumption is that 95 of a particular product is prepared each year in each BLM office. This estimate is entered in Column B of the "Current_Costs" worksheet, and carried forward to the same area of the "Future_Costs" worksheet. What would happen to the overall result if this critical estimate is incorrect? What if, for example, the annual number of products per office were increased 25% or decreased 25%?

Table 7.1 shows the results. To obtain these numbers, it was necessary only to replace "95" in column B of the "Current_Costs" spreadsheet with 71.5 (for a 25% decrease) and then, in a separate step, to 118.75 (for a 25% increase. The results show that this particular assumption is critical to the magnitude of the result, but does not result in a negative benefit/cost ratio. An interest further analysis is to determine how low the annual number of products per office could drop before the project's costs outweighed its benefits. The answer is approximately 30—so you could argue that the positive benefit/cost result is very robust.

Table 7.1 Results of Sensitivity Analysis in the Example

Case	Net Present Value	B/C Ratio	Breakeven Year
Base Case (95 per year)	$50.8 million	**3.2**	2003
-25% (71.25 per year)	$32.2 million	**2.4**	2004
+25% (118.75 per year)	$66.5 million	**3.8**	2002

8 Comparing Alternatives

The whole purpose of financial analysis is to show that the recommended project is the best use for BLM's IT dollars. Practically speaking, this means it is the best of the alternatives considered, where the alternatives implicitly include the "do-nothing" alternative—a no go decision on any alternative.

8.1 Benefit-Cost Ratios

If you have completed a benefit-cost analysis of each of your alternatives using the SCO template, you will automatically have a benefit-cost ratio for each. This is calculated from the discounted benefits and costs, so the time value of money is already incorporated. The alternative with the largest ratio of benefits to costs is generally preferred.

Of course, management does not have to choose the highest benefit-cost ratio, since there are other factors that could enter into their decision. For example, they could have more confidence in the outcome of one alternative. There also can be legitimate considerations that are beyond the scope of a quantitative financial analysis, such as intangible benefits. To the extent that your risk analysis and quantitative sensitivity analysis take uncertainties and other sources of error into consideration, you may be able to anticipate management's concerns, and show them quantitatively the impact of key variables on their decision.

In addition to the ratio of benefits to costs, management may weight the payback period heavily. Based on their level of confidence concerning the stability of the physical or financial IT environment, they may strongly prefer an alternative that pays back its costs most quickly. Especially in the IT world, an alternative that takes more than 5 years to break even may never get out of the red, because the IT environment changes so quickly. If you have an alternative with a long payback period, you should address this as a source of risk.

8.2 Net Present Cost

In a cost effectiveness analysis, all alternatives, by definition, achieve equal benefit. Therefore, ranking alternatives is simply a matter of ranking from lowest to highest net present cost. Presumably, management will select the lowest-cost alternative, but could factor in other considerations here as well. Again, a thorough risk analysis and

sensitivity analysis can anticipate many of management's concerns, and provide a basis for greater confidence in the results of your financial analysis.

8.3 Other Measures of Value

You may be wondering about measures of project value that are tossed around. As stated in section 1, these are not necessary for you to use in analyzing BLM IT proposals. However, it may prove useful to you to have an idea what some of these terms mean, in case they come up somewhere down the line.

"Return on Investment (ROI)" Think of ROI as the "dividend" you earn by gaining benefits greater than total costs. If a company invests $500,000 in a machine, and gets back $550,000 in benefits, the ROI is $550,000 minus $500,000, divided by $500,000, or 10%. That is exactly the same as a benefit-cost ratio of 1.1. There is no particular value for calculating ROI when considering Government investments.

"Net Present Value" Net present value is just the net present value of benefits minus the net present value of costs. Businesses use net present value to decide among alternative investments of similar magnitudes that return different benefits over widely different time periods. Net present value comparisons are unnecessary for BLM IT investment purposes.

"Internal Rate of Return" This is another way of expressing how much benefit you realize for your investment, over the entire analysis period. The internal rate of return is equal to the discount factor you would have to apply to the benefits in order to make them equal to project costs (net present value = zero). If that rate is less than the cost of capital to perform the project, the project would be a money-loser. Save this one for the Business Case of your post-retirement start-up company.

8.4 Maintaining Your Benefit-Cost Analysis

SCO recommends that you maintain your financial analysis throughout the life of the project, including production operations. As long as your project and product are part of the BLM IT Investment Portfolio, its continued value will be subject to review. If further development is required, an updated benefit-cost analysis will support your request. Finally, SCO hopes to compile information on the planned versus actual benefits and costs that BLM IT projects realize. Over time, the BLM will improve the accuracy of its estimates, and thereby improve IT investment management.

You may wish to set a regular schedule for updating your financial analysis, say, every quarter during development and twice yearly after deployment. Occasions that call for an update could include (1) any major shift in scope, approach, costs, or expected benefits; (2) an in-progress review by the ITIB or other management; (3) new management; or (4) a need to compare this project to a competing proposal, or to tie it into a complementary proposal.

Be sure to preserve your financial analysis, including all assumptions, in a backup file before you make revisions. Successive versions of the financial analysis should be maintained as a permanent part of the project record.

9 Getting Help

SCO wants to help you succeed in performing sound financial analysis. If you have questions about any aspect of this requirement, please contact SCO at (303) 236-8915. Since SCO is the primary reviewer of financial analyses created for the ITIB, SCO is in a position to advise you on the various murky issues that sometimes arise.

Another smart move is to go to the SCO intranet site and download several examples of financial analysis from projects that seem similar to yours. Project documents are available at **http://web.blm.gov/internal/wo-500/sco/sco_projects.htm**

10 References

The following references have been cited throughout this report:

1. OMB Circular A-76 "Performance of Commercial Activities" and Supplement, and especially Part 2 "Preparing the Cost Estimate". Download at: **http://www.whitehouse.gov/OMB/circulars/index.html**.
2. OMB Circular A-94 "Guidelines and Discount Rates for Benefit Cost Analysis of Federal Programs". Download at: **http://www.whitehouse.gov/OMB/circulars/index.html**.
3. OMB Letter "Estimating Paperwork Burden", October 14, 1999. Download at: **http://www.whitehouse.gov/OMB/fedreg/5cfr1320.html**.
4. "ROI and the Value Puzzle", Capital Planning and IT Investment Committee, Federal CIO Council, April 1999. Download at: **http://www.cio.gov/docs/library.html**.
5. "Help and Guidance", including formats, templates, and procedures, from Systems Coordination Office at **http://web.blm.gov/internal/wo-500/sco/sco_procedures.htm**
6. Budget of the United States Government, and Mid-Session Reviews, from the Government Printing Office site: **http://w3.access.gpo.gov/usbudget/**

APPENDIX A TEMPLATES FOR BENEFIT-COST AND COST EFFECTIVENESS ANALYSIS

- Benefit Cost Example (Excel format)
- Benefit Cost Template (Excel format)
- Cost Effective Analysis Spreadsheet (Excel format)